

NAVY COOPERATIVE ENGAGEMENT ARCHITECTURE

VOLUME THREE
WORKING GROUP FINAL REPORT

APPENDICES F AND G

WSA&E

WARFARE SYSTEMS ARCHITECTURE & ENGINEERING

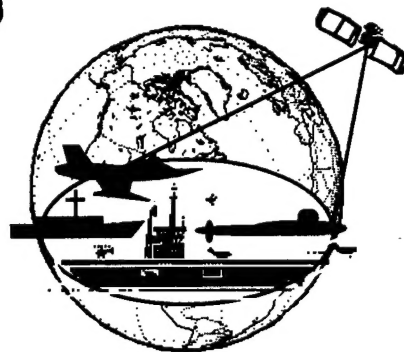
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APPENDIX F
COOPERATIVE ENGAGEMENT THREAT EXAMPLES

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LOW, RO CRUISE MISSILE THREAT EXAMPLE

Characterization of the Threat: This threat is characterized by long range, subsonic, low flying (sea skimmer) attack profiles with reduced-observability (RO) in both the radar and IR spectrum. It could have an autonomous guidance system, with a multi-spectral terminal guidance sensor suite comprising both active radar and IR seekers. Some versions may be anti-radiation (ARM) capable and/or incorporate a Home-On-Jam (HOJ) feature. A target discrimination capability may be resident as well.

Advantages of Cooperative Engagement alternatives to defeat this threat example: Low altitude flight profiles of this threat make single platform target detection and classification a difficult task. Even the initial implementation of a Cooperative Engagement capability can significantly improve the battle force's ability to counter the threat. Specific CE OPCODES which may be employed to defeat this type of threat include the following:

- Correlation/fusion of fragmented track information contained in the surface shared data base from similar and/or dissimilar sources leads to an earlier detection.
- Augmentation of the data base with airborne surveillance extends target recognition, identification and engagement.
- Allocation of track responsibilities reduces redundant engagements.
- A battle force level Threat Evaluation and Weapons Assignment (TEWA) function provides enhanced platform/weapons allocation to targets.

EW and Signature Management Applications: EW and Signature Management tactics could also be employed to minimize the threat missile's single shot probability of kill (Pssk). EW tactics could include both active jamming (AECM) and dispensing of distraction and seduction chaff. Signature Management techniques could be combined with EW to minimize the success of ARM threats. EW tactics could also include the deployment of offboard deception devices.

Specific EW and Signature Management Cooperative Engagement OPCODES which may be employed to defeat this threat include:

- Correlation of Electronic Support Measure (ESM) information with other battle force sensors (radar,IRST, etc.) via the shared data base may indicate the presence of ARM threats.
- Force level TEWA assigns appropriate counter-ARM decoy to be deployed from surface or air platform yielding largest geometric advantage in threat engagement.

- Air augmented surveillance picture yields significant indication and warning (I&W) speeding EW response time for chaff deployment and bloom.
- Signature management of targeted surface units reduces ARM Pssk.
- Target position and maneuver information via the shared data base yields assessment of soft kill success.

OUTER AIR BATTLE THREAT EXAMPLE

Characterization of the Threat: This threat is characterized by saturation raids employing multiple launch platforms and weapons. Bombers and fighter escort, both subsonic and supersonic, are included. Escort EW assets provide active jamming of surveillance and communication links. Both high and low attack profiles could be present. Stream raids, diversion feints, individual penetrators in multi-axis coordinated attacks could be present with a mix of conventional and RO platforms and weapons.

Advantages of Cooperative Engagement alternatives to defeat this threat example: The OAB poses a significant threat to own force air superiority. Coordinated attacks could occur from several approach axis using multiple platforms in order to saturate the defenses. Diversionary tactics could be employed to cause the expenditure of hard kill assets before weapons arrival. Long range detection of the OAB threat may be difficult. Specific CE OPCONS which may be employed to defeat the OAB threat could include the following:

- Shared tactical information between surface units augmented by air surveillance could significantly extend the detection horizon.
- Correlation/fusion of battle force individual sensor data fragments permit earlier formation of target tracks.
- Dispersed battle force sensor capability could provide for maintenance of tactical picture despite adversary's attempt to jam or counter-target.
- Linking of surveillance and intelligence assets from non-organic sources would give improved I&W resource, maximizing battle force reaction time.
- Shared database could allow silent, dispersed shooters to share a common tactical picture of battle force and threat dispositions to engage individual OAB penetrators.
- Forward pass capability between surface units sharing the tactical picture could expand the battle space to exploit over the horizon weapons engagement of the OAB threat.
- Improved data collection and correlation from dispersed multi-sensor units provides for increasingly efficient, effective, and timely kill assessment of OAB threats.

EW and Signature Management Applications: EW and Signature Management tactics could be employed within the arena of the OAB to minimize detection of the Mission Essential or High Value Units of the battle force. The objective of the battle force employing Cooperative Engagement options would be to avoid detection by hostile forces for as long as possible while also

engaging hostile launch platforms attempting to deliver anti-ship ordnance. To this end EW could initially serve as a counter-surveillance/counter-reconnaissance asset employed by Blue forces to either deny hostile detection of force disposition or to serve as a cover and deception capability to confuse hostile launch platform operators attempting to target the battle force.

The role of signature management tactics during the initial phases of the OAB could be to deny hostile surveillance and reconnaissance assets the ability to detect battle force position through the detection of telltale electronic emissions. Signature management tactics may cover a range of options from total emission control (EMCON) silence of the high value units to deceptive employment of simulated emissions from a "decoy battle force". Cooperative Engagement options could afford the battle force commander the flexibility of engaging the enemy while also minimizing the detection of his mission essential units using available signature management options.

Specific EW and Signature Management Cooperative Engagement OPCONS which could be employed to defeat the OAB threat include:

- Participation in signature management tactics by all battle force assets could be available through cooperative control of electronic emissions at the platform level.
- The ability to keep high value units (HVU) in total EMCON silence could minimize detection by hostile forces employing electronic surveillance and reconnaissance.
- Engagement actions within the Outer Air Battle region can be controlled by air units while surface forces maintain the flexibility to selectively participate in signature management tactics
- Integration of individual platform ESM data could provide for a more complete and comprehensive electronically generated intelligence picture, with added targeting advantages from passive ranging techniques.
- Focused EW engagements by both air and surface units could delay threat acquisition of Blue Force disposition.
- Shared tactical picture between surface and air units could significantly increase soft kill options at OAB ranges from the mission essential units.
- Fusion of multi-sensor/multi-platform passive ESM track data fragments could yield high quality tracks on OAB threats while maintaining battle force electronic signature control.

FAST HIGH FLYER THREAT EXAMPLE

Characterization of the Threat: This threat is characterized by high altitude, steep dive angle attack profiles against battle force surface units. Delivery could occur from multiple launch platforms including both bombers and fighters in multi-axis coordinated attacks. Ballistic threats may also be employed and could be launched from land sites. Multiple EW resources employing active jamming could be present from escort aircraft. A mix of conventional and RO platforms and weapons could occur. A significant infrared signature could be present. Terminal homing may incorporate multi-spectral guidance modes. Some versions may be ARM capable and/or possess a Home-On-Jam (HOJ) feature. The high attack angles combined with high speed terminal approaches present an extremely time sensitive threat response scenario.

Advantages of Cooperative Engagement alternatives to defeat the threat: Advantages of Cooperative Engagement alternatives to defeat the Fast High Flyer threat are:

- Improved reaction time due to air augmented surface shared database could lead directly to earlier fire control solutions and kill assessment.
- Force level TEWA could provide for enhanced platform/weapons allocation to Fast High Flyer targets.
- "Cooperative" allocation of track responsibilities could reduce likelihood of redundant engagements.
- Continuous track could be maintained allowing for scheduling of weapons engagements throughout the attack profile, even when the Fast High Flyer threat drops below the radar horizon of the engaging ship.
- Maximum intercept range could be achieved in threat terminal approach phase since the threat never appears as a "pop-up" target to the engaging unit.

EW and Signature Management Applications: EW and Signature Management tactics could be employed against the Fast High Flyer threat to minimize threat Pssk. EW tactics could include the use of distraction and seduction decoys and may be used in conjunction with AECM. Offboard deception devices could be employed as well to decoy the threat away from high value surface units.

Specific EW and Signature Management Cooperative Engagement OPCODES which may be employed to defeat the Fast High Flyer threat include:

- Due to the presence of continuous track, EW engagements may be employed during the phase of the attack profile in which there is least likelihood of threat reacquisition and targeting.

- Air augmented surveillance during the dive phase of the attack profile would allow more effective hard kill/soft kill assessment facilitating conservation of engagement assets.
- Fusion of ESM information with other battle force sensors (radar,IRST, etc.) via the shared data base may reveal the presence of ARM threats.

FAST SEA SKIMMER EXAMPLE

Characterization of the Threat: This threat is characterized by supersonic low altitude attack profiles. Delivery could occur from multiple launch platforms including bombers, fighters, surface ships and submarines in multi-axis coordinated attacks. Multiple EW resources providing active jamming of communication and sensor links could be present from escort aircraft and surface vessels. A mix of conventional and RO air launch platforms and weapons could be present. A significant infrared signature could be expected. Terminal homing may utilize multi-spectral guidance modes and evasive "dog-leg" maneuvers. Some versions may be ARM capable and/or incorporate an HOJ feature. A target discrimination capability may be resident as well. The low altitude, high speed terminal runs present an extremely time sensitive threat response scenario to the battle force surface units.

Advantages of Cooperative Engagement alternatives to defeat this threat: Advantages of Cooperative Engagement alternatives to defeat the Fast Sea Skimmer threat are:

- Linking of surveillance and intelligence assets from non-organic sources gives improved I&W resource, maximizing battle force reaction time.
- Advanced warning due to common tactical picture could provide the potential for engagement prior to Fast Sea Skimmer entry into the surveillance envelope of the engaging asset.
- Surface shared database would yield improved countermeasures resistance through utilization of remotely sensed data.
- Air augmented surveillance picture would improve reaction time leading directly to earlier fire control solutions and kill assessment.
- Surface forward pass capability allows magazine depleted platforms to continue to participate in a detection, guidance and control role.
- Battle force reconfiguration could be available to offset battle damaged assets.
- Remote data engagement provided by shared database could give ARM resistance to forward deployed "Silent Sam"

EW and Signature Management Applications: EW and Signature Management tactics could be employed against the Fast Sea Skimmer threat to minimize threat Pssk. EW tactics could include both AECM and dispensing of distraction and seduction chaff. Signature Management techniques could be combined with EW tactics to minimize the success of ARM threats.

Specific EW and Signature Management Cooperative Engagement OPCODES which may be employed to defeat the Fast Sea Skimmer threat include:

- In the face of complex soft kill engagements, the common tactical picture lends support to determining which threats continue to pose a danger to battle force high value units.
- Air augmented surveillance picture yields significant I&W speeding EW response time for chaff deployment and bloom.
- The threat could be engaged with AECM in order to induce HOJ. The missile would alter course towards the jamming source improving battle force hard kill success by minimizing crossing target threat trajectories.
- Fusion of ESM information with other battle force sensors (radar,IRST, etc.) via the shared data base could indicate the presence of ARM threats.
- Force level TEWA could assign appropriate counter-ARM decoy to be deployed from surface or air platform yielding largest geometric advantage in threat engagement.

DRUG INTERDICTION THREAT EXAMPLE

Characterization of the Threat: This threat illustrated in Figure 5-5 is characterized by ships and airplanes attempting to deliver drugs to the United States. While unconventional in nature, the problem is not unlike the first four, with a major emphasis on synergistic sensing with engagement up to and including location and interception. The diverse nature of the contacts and their large numbers present significant problems for tracking and identification. Low RCS of some aircraft, coupled with low altitude ingress, present additional problems. Differentiation of "threat" aircraft from general and commercial aviation aircraft present an extremely stressing case. Moreover, great differences exist between equipments currently in use by the various agencies, such as FAA, DEA, Customs, Coast Guard, Air Force, Navy, and National Technical Means.

Advantages of Cooperative Engagement alternatives to defeat this threat:

- Linking of surveillance and intelligence assets from non-organic sources could give improved indications and warning (I&W) resource, maximizing reaction time.
- Advanced warning due to common tactical picture would allow potential for engagement prior to target entry into the surveillance envelope of the engaging asset.

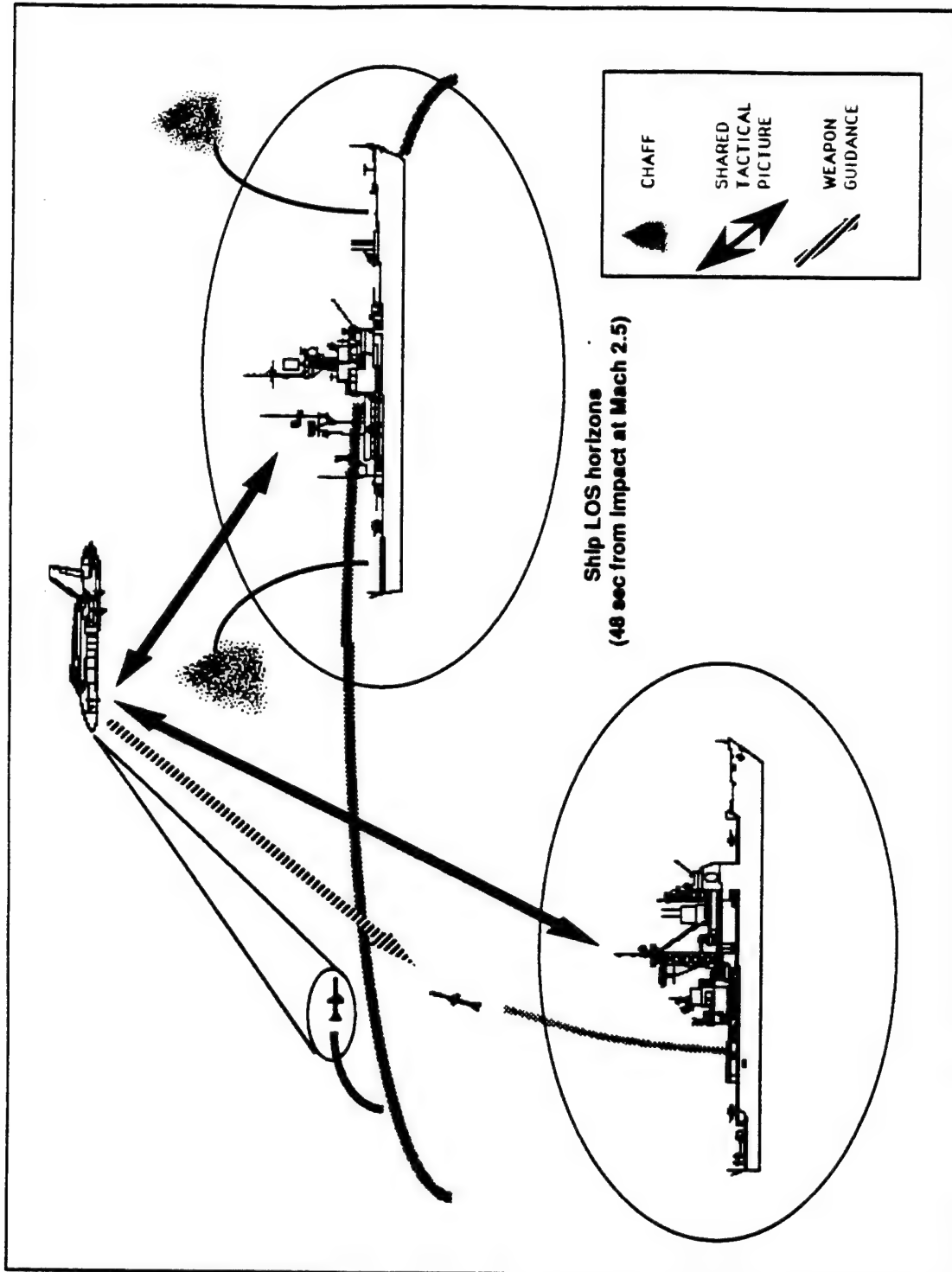


Figure F-1. Low, Slow RO Cruise Missile Threat Example

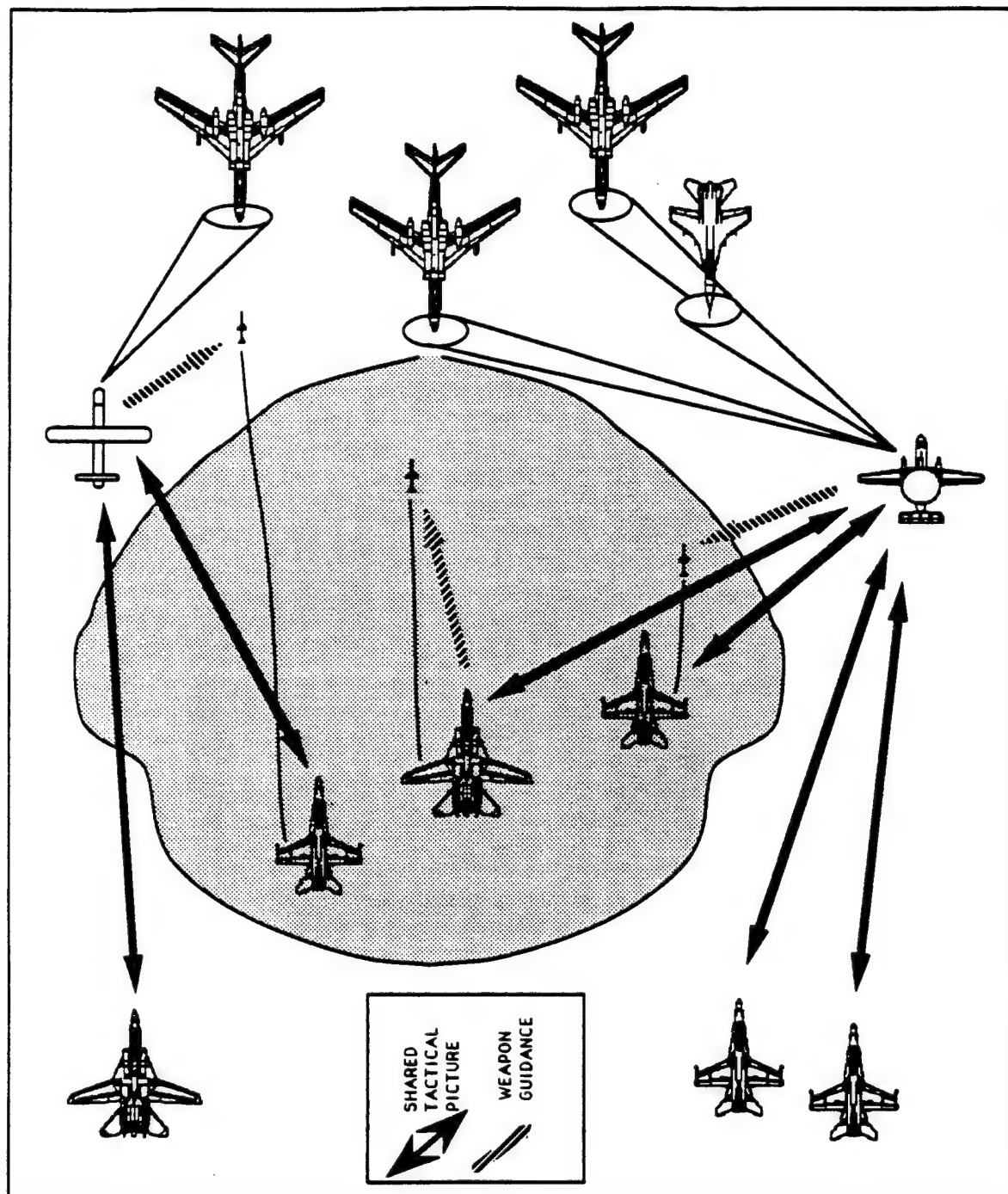


Figure F-2. Outer Air Battle Threat Example

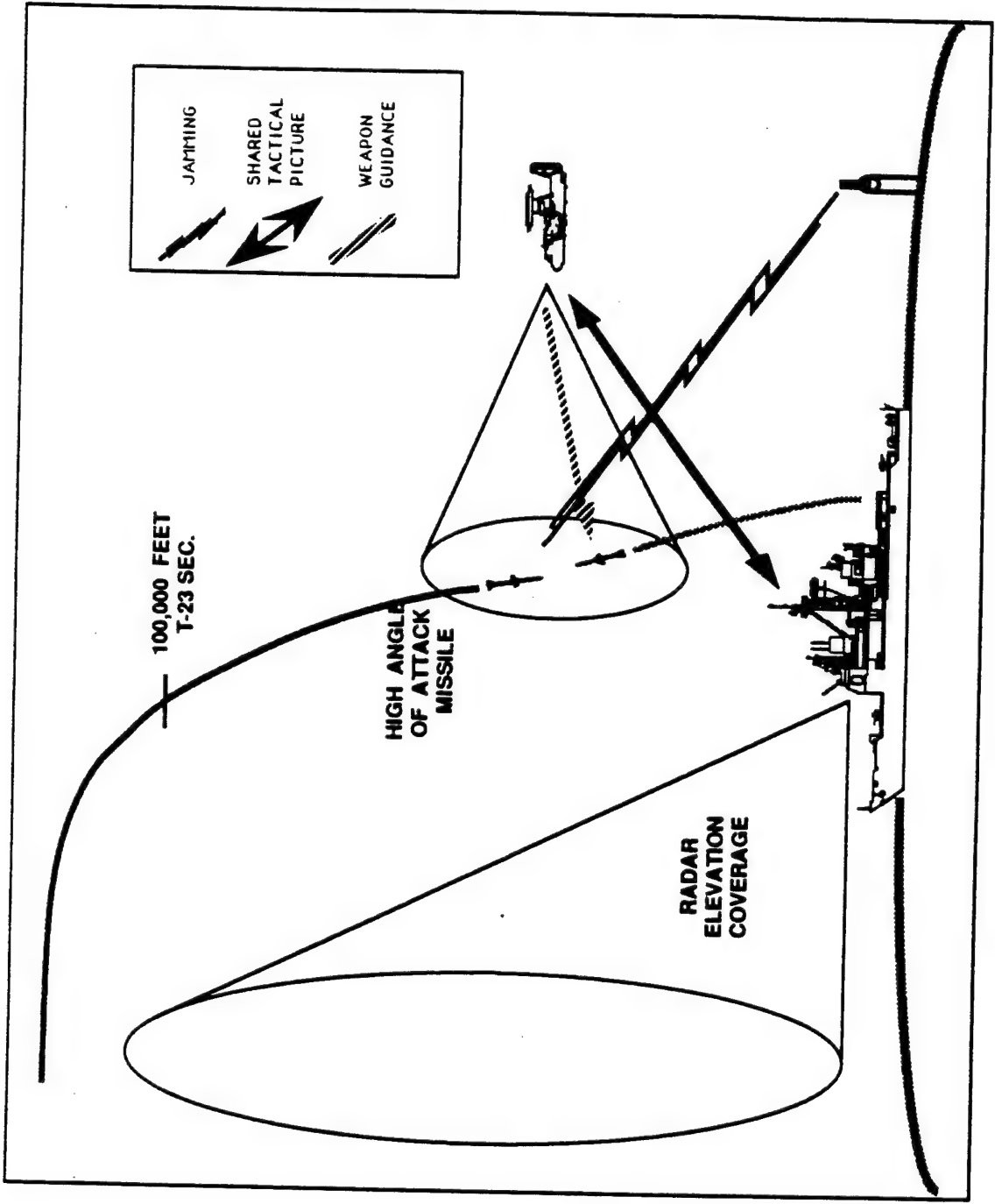


Figure F-3. Fast High Flyer Threat Example

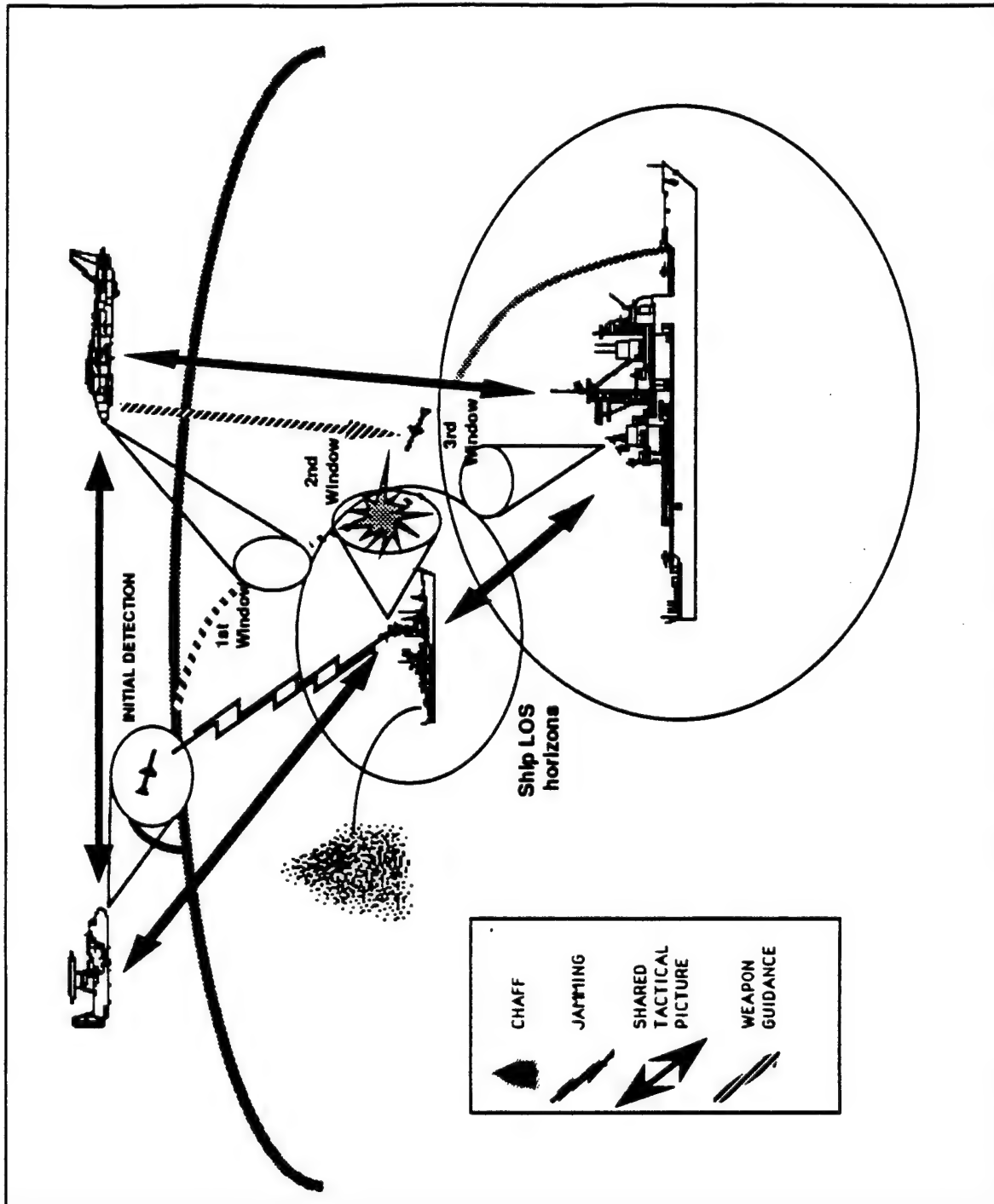


Figure F-4. Fast Sea Skimmer Threat Example

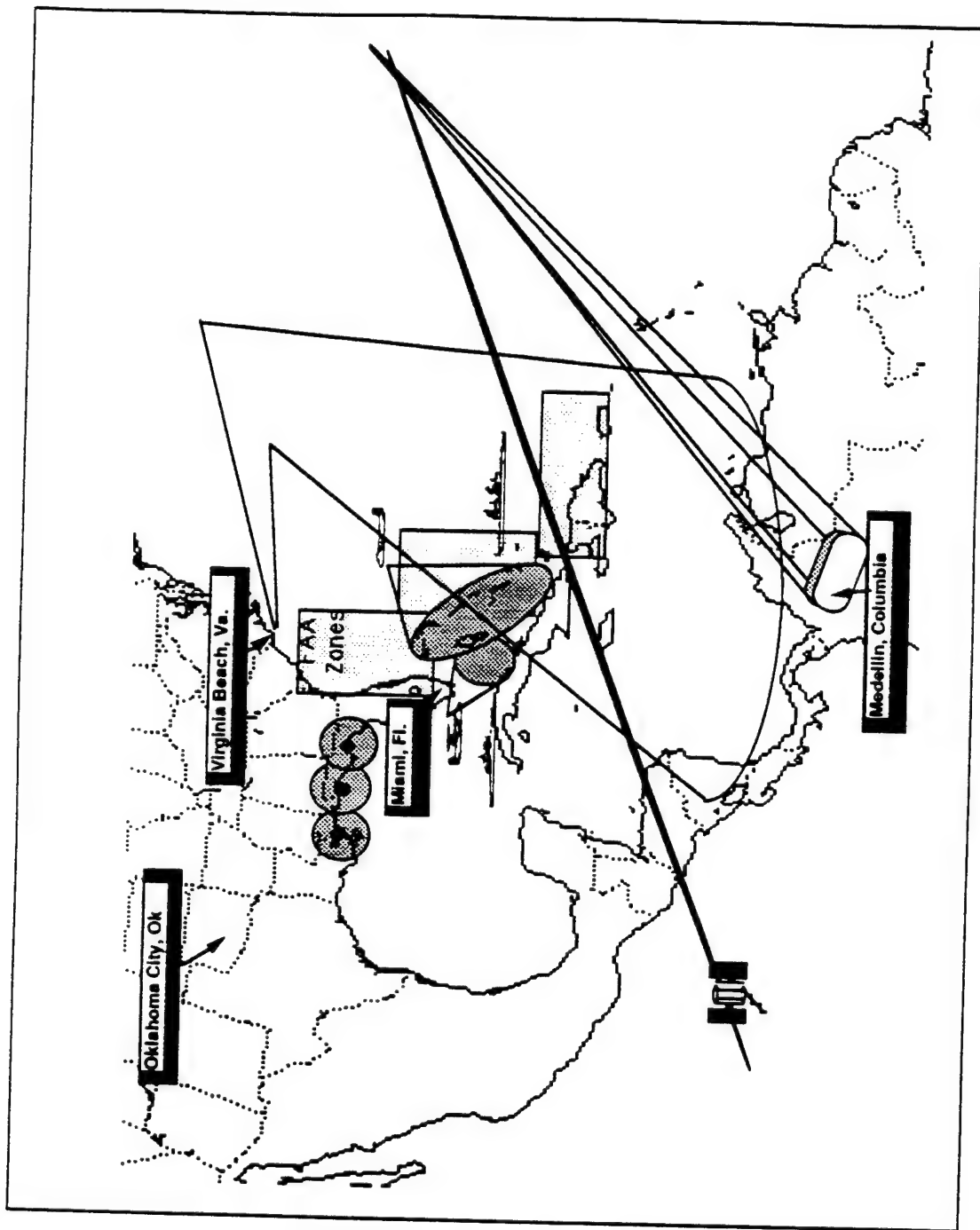


Figure F-5. Drug Interdiction Threat Example

APPENDIX G
COOPERATIVE ENGAGEMENT CASES

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INTRODUCTION

Through the course of analysis of the Cooperative Engagement concept, a set of basic capabilities were defined which could then be combined or layered into various configurations resulting in increased capabilities. The nine configurations are introduced here. Subsequent pages provide further definition of each of these Cases.

CASE 1: A common, shared, database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the sea surface units of the Force, such that all surface units have a consistent tactical picture of engagement quality. Weapon guidance and control functions would be provided by the launching platform.

CASE 2: A common, shared, database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the sea surface units, and air surveillance units of the Force, such that all surface units have a consistent tactical picture of engagement quality. Weapon guidance and control functions would be provided by the launching platform. The air-derived sensor information may be either track quality data or raw data only, depending on the ability of the surface net to fuse data or only correlate tracks.

CASE 3: A common, shared, database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the sea surface units of the Force, such that all surface units have a consistent tactical picture of engagement quality, with the added option to launch missiles from any ship in the Force and provide missile flight and terminal control from any other properly configured ship in the Force.

CASE 4: A common, shared, database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the sea surface units, and air surveillance units of the Force, such that all surface units have a consistent tactical picture of engagement quality, with the added option to launch missiles from any ship in the Force and provide missile flight and terminal control from any properly configured air unit in the Force.

CASE 5: A common, shared, database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the air units of the Force, such that all air units have a consistent tactical picture of engagement quality. Weapon guidance and control functions would be provided by the launching platform.

CASE 6: A common, shared, air database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the units of the Force, and augmented by multi-media sensors external to the Force that are accessed through other Service sources, Joint Commands, National sources, or allies. Weapon guidance and control functions would be provided by the launching platform.

CASE 7: A common, shared, database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the air units of the Force, with the added option to launch missiles from any air unit in the Force and provide missile flight and terminal control from any properly configured air unit in the Force.

CASE 8: A common, shared, database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the air and surface units of the Force, such that all participating air and surface units have a consistent tactical picture (appropriate to their area of operations) of engagement quality. Weapon guidance and control functions would be provided by the launching platform.

CASE 9: A common, shared, database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the air and surface units of the Force, such that all participating air and surface units have a consistent tactical picture of engagement quality, with the added option to launch missiles from any air or surface unit in the Force and provide missile flight and terminal control from any properly configured air or surface unit in the Force.

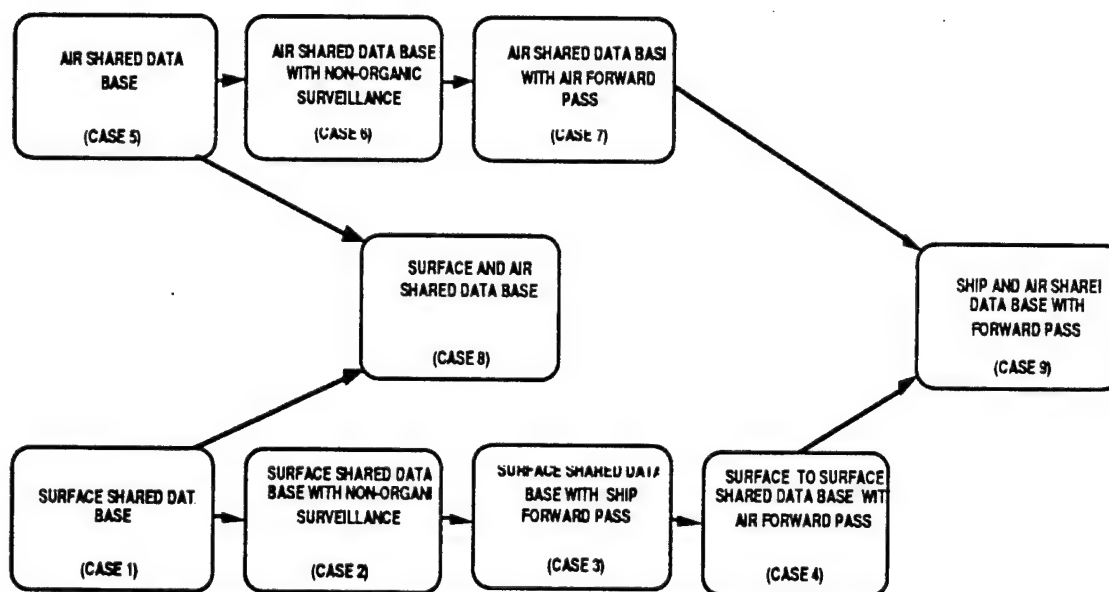


Figure G-1. Cases Diagram

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CASE 1 - SURFACE SHARED DATABASE

Definition

A common, shared, database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the sea surface units of the Force, such that all surface units have a consistent tactical picture of engagement quality. Weapon guidance and control functions would be provided by the launching platform.

Operational advantages

- Fusion of multi-sensor track data fragments to attain high quality tracks on "single sensor" detected low observable targets.
- Force Level Signature Management, providing for selected unit emission control.
- Silent, dispersed shooters are able to receive or share in a common tactical picture.
- Closer control on allocation of track responsibilities, reducing likelihood of redundant engagements.
- Force level threat evaluation and weapons assignment (TEWA), to provide for enhanced platform/weapons allocation to targets within the geometric limits of engagement.
- Integration of individual platform ESM data, providing for a more complete and comprehensive electronically generated intelligence picture, with added targeting advantages from passive ranging techniques.
- Improved pairing of sensor and shooter, to optimize weapons performance envelope.
- Improved countermeasures resistance, through utilization of remote data engagement capability.
- Provides option for remote data engagement by a surveillance-silent platform.
- Improved data collection and correlation from dispersed multi-sensor units, providing for increasingly efficient, effective, and timely kill assessment.

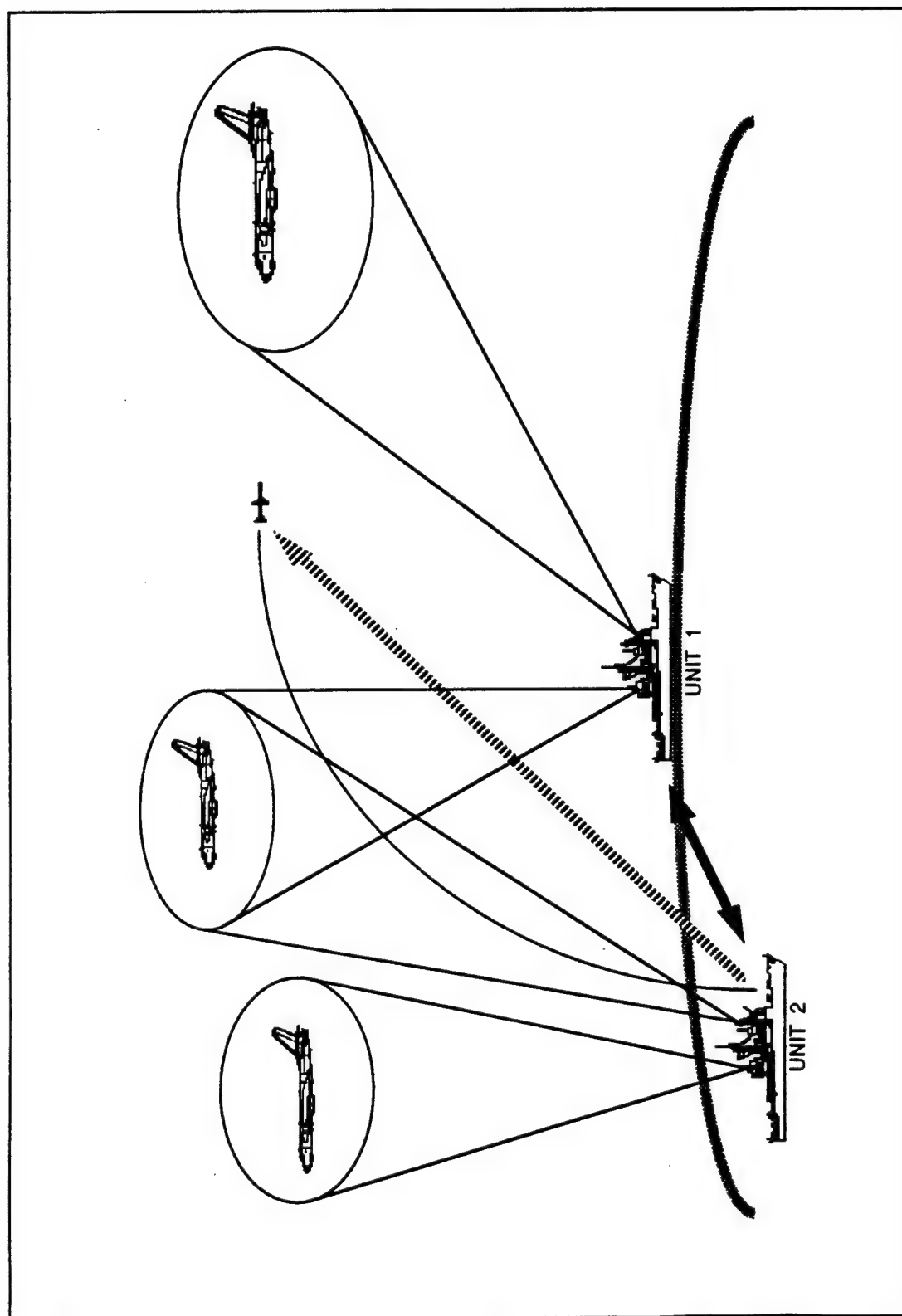


Figure G-2. Surface Shared Database

CASE 2 - SURFACE SHARED DATABASE AUGMENTED BY AIR SURVEILLANCE

Definition

A common, shared, database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the sea surface units, and air surveillance units of the Force, such that all surface units have a consistent tactical picture of engagement quality. Weapon guidance and control functions would be provided by the launching platform. The air-derived sensor information may be either track quality data or raw data only, depending on the ability of the surface net to fuse data or only correlate tracks.

Operational advantages

- Extends detection horizon, to allow for over-the-horizon targeting and engagement, depending on missile terminal capabilities and requirements.
- Improves reaction time, leading directly to earlier fire control solutions and kill assessment.
- Increases depth of fire.
- Increases surface EMCON options, particularly improving ability to keep high value units (HVV) in total EMCON silence..
- Increases time available to initiate and deploy soft kill options.
- Provides increased capability to vary spatial sensing relationships in a timely manner, by taking advantage of the higher mobility of airborne sensors.
- Further expands geometric limits of engagement for Force level TEWA options.

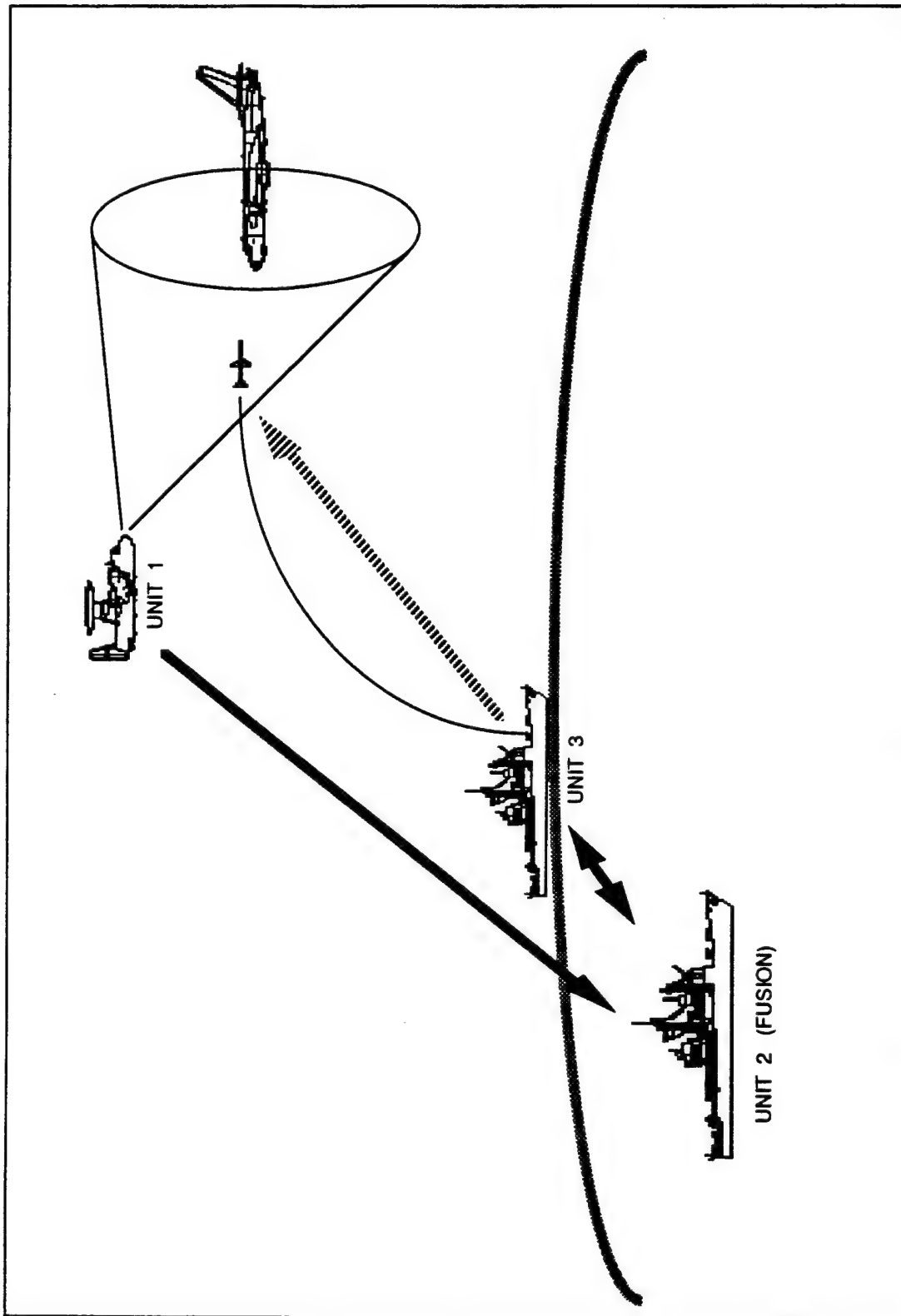


Figure G-3. Surface Shared Database Augmented by Air Surveillance

CASE 3 - SURFACE SHARED DATABASE AUGMENTED BY SURFACE FORWARD PASS

Definition

A common, shared, database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the sea surface units of the Force, such that all surface units have a consistent tactical picture of engagement quality, with the added option to launch missiles from any ship in the Force and provide missile flight and terminal control from any other properly configured ship in the Force.

- Dispersed sensor-guidance-shooter capabilities expands overall Force missile performance envelope.
- Greater flexibility in Force configuration and reconfiguration capability, increasing ability to offset battle damage.
- Potential for increased weapon platform availability can reduce uneven missile expenditure.
- Expands surveilled battle space to exploit over the horizon targeting (OTH-T) capability, including cuing for earlier detection, targeting, and weapons engagement.
- Provides flexibility in Force configuration by employing remote magazine launch from missile-rich or sensor-limited surface platforms that utilize targeting and engagement data from forward deployed units.
- Magazine depleted platforms may continue to participate in a detection, guidance, and control role in the sensor-to-shooter evolution.
- Provides option for remote magazine launch engagement from forward deployed silent platform.

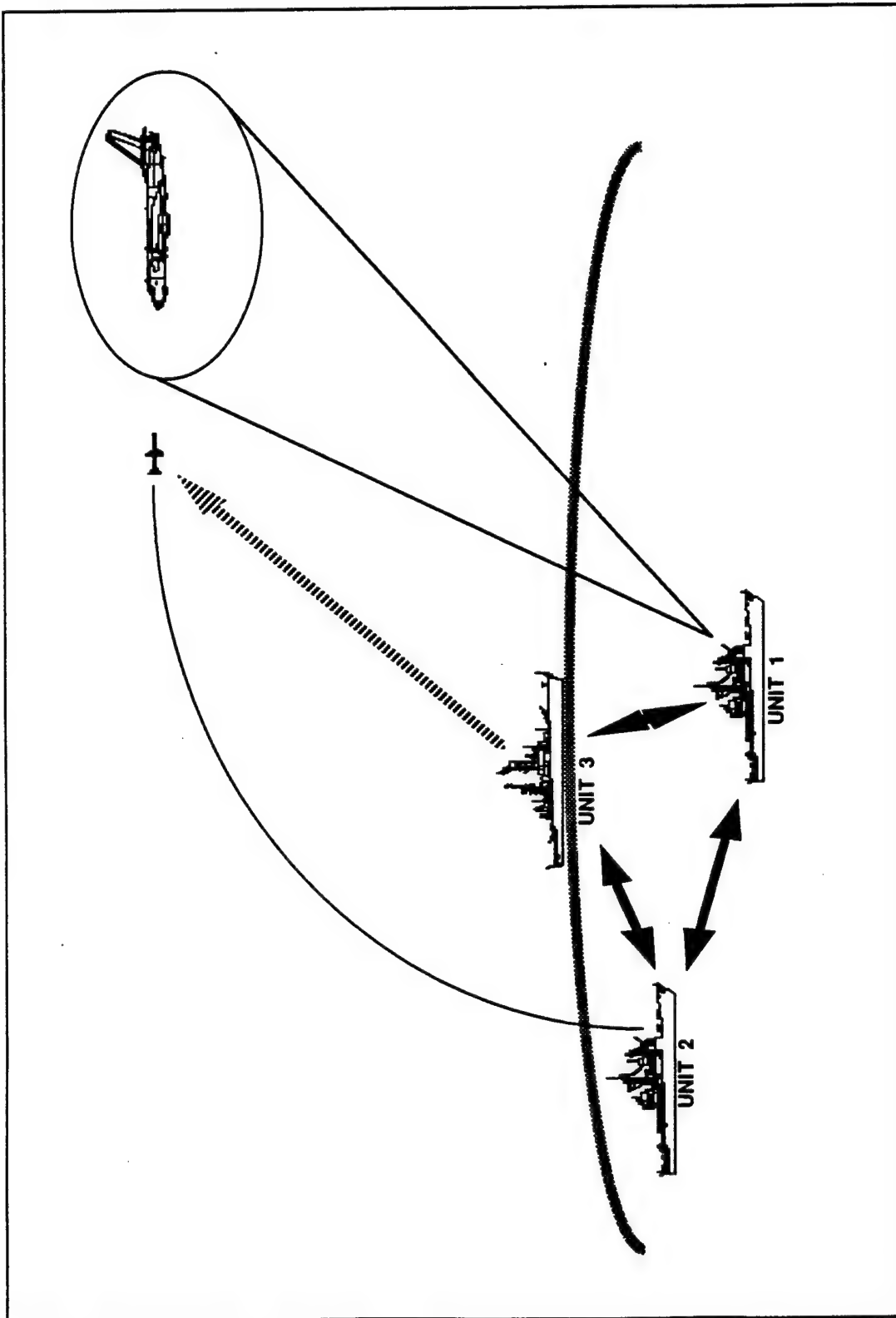


Figure G-4. Surface Shared Database Augmented by
Surface Forward Pass

CASE 4 - SURFACE SHARED DATABASE AUGMENTED BY AIR SURVEILLANCE AND AIR FORWARD PASS

Definition

A common, shared, database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the sea surface units, and air surveillance units of the Force, such that all surface units have a consistent tactical picture of engagement quality, with the added option to launch missiles from any ship in the Force and provide missile flight and terminal control from any properly configured air unit in the Force.

Operational advantages

- Guidance, control, and engagement space is increased beyond that of the surface forward pass capability.
- Expands the battle space for surveillance, targeting, and weapon engagement to the kinematic limits of surface-to-air launched missiles.
- Gives over-the-horizon (OTH) engagement capability to sensor range limited surface units equipped with OTH capable missiles.
- Increases controlled battle space and depth-of-fire capability.
- Provides Force level access to magazine missile expenditure options for surface platforms.
- Provides for greater firepower capability at extended ranges.
- Affords countermeasure resistance, by allowing disposition of airborne weapon control units outside the jamming environment.
- Allows added options for surface unit signature management tactics, while air units control engagements.
- Provides increased off-axis flexibility to engage opposing forces, due to the added airborne unit capability and mobility over that of surface only guidance and control units.

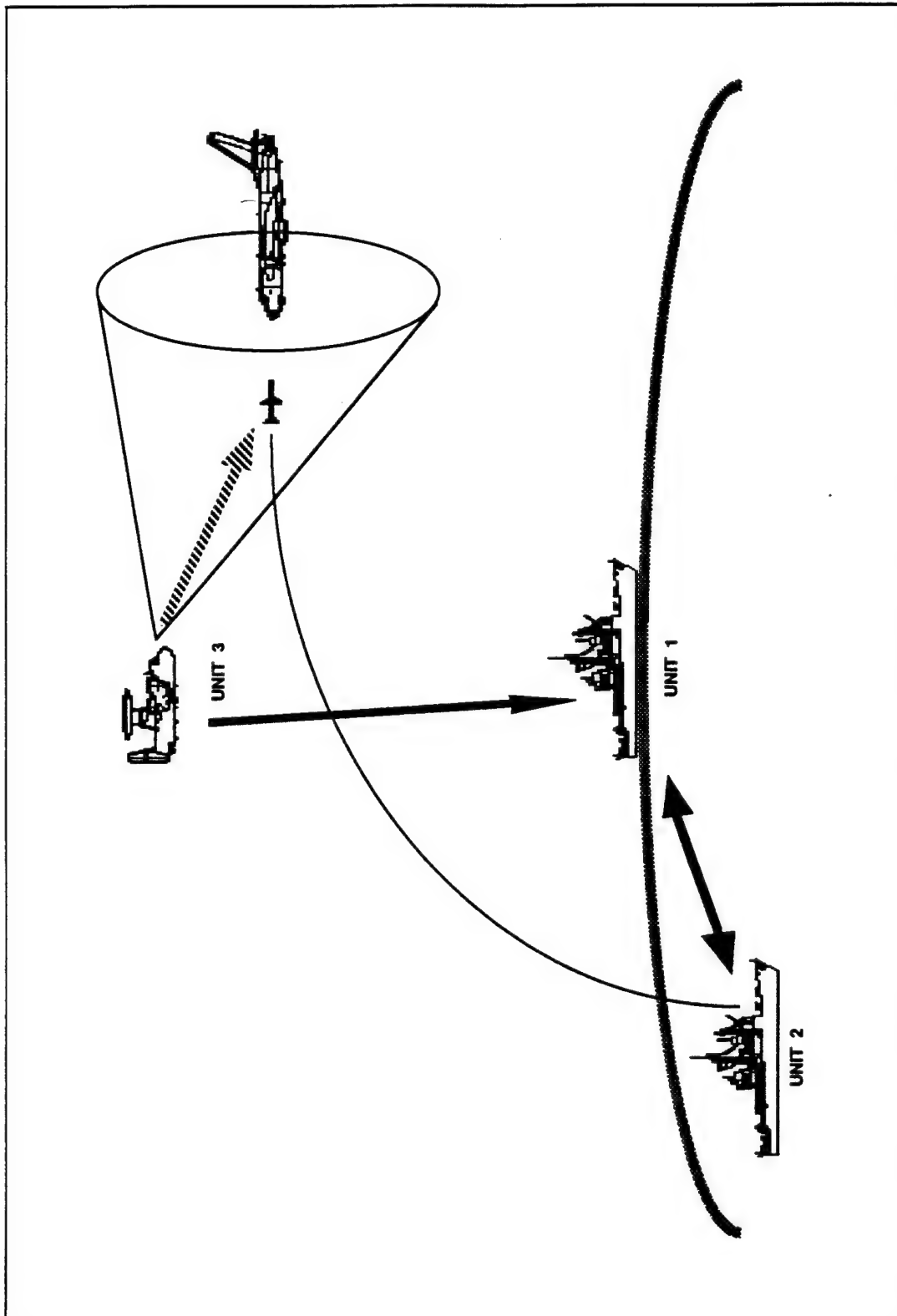


Figure G-5. Surface Shared Database Augmented by Air Surveillance and Air Forward Pass

CASE 5 - AIR SHARED DATABASE

Definition

A common, shared, database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the air units of the Force, such that all air units have a consistent tactical picture of engagement quality. Weapon guidance and control functions would be provided by the launching platform.

Operational advantages

- All the capabilities of the surface shared database, but with the flexibility and mobility provided by air assets.
- Mobility and spatial positioning capability of platforms employing diverse sensor capabilities, each of which contribute to a multi-sensor fused tactical picture, provides for dramatically improved options to obtain track quality data on otherwise low observable targets.
- Provides for enhanced weapons employment capability in an expanded battle space.
- Provides an option for silent tracking by airborne weapons platforms, up to the point of committing weapons.
- Supports application of focused EW initiatives to delay threat acquisition of Blue Force disposition.
- Provides for capability of dispersed and unpredictable radar emission tactics in tracking and targeting, that inhibit adversary potential to jam or counter-target.
- Force TEWA options, conducted on board an ATS type aircraft, provides the option for counter platform phase cooperative engagements at great distance for the surface units of the Battle Force.

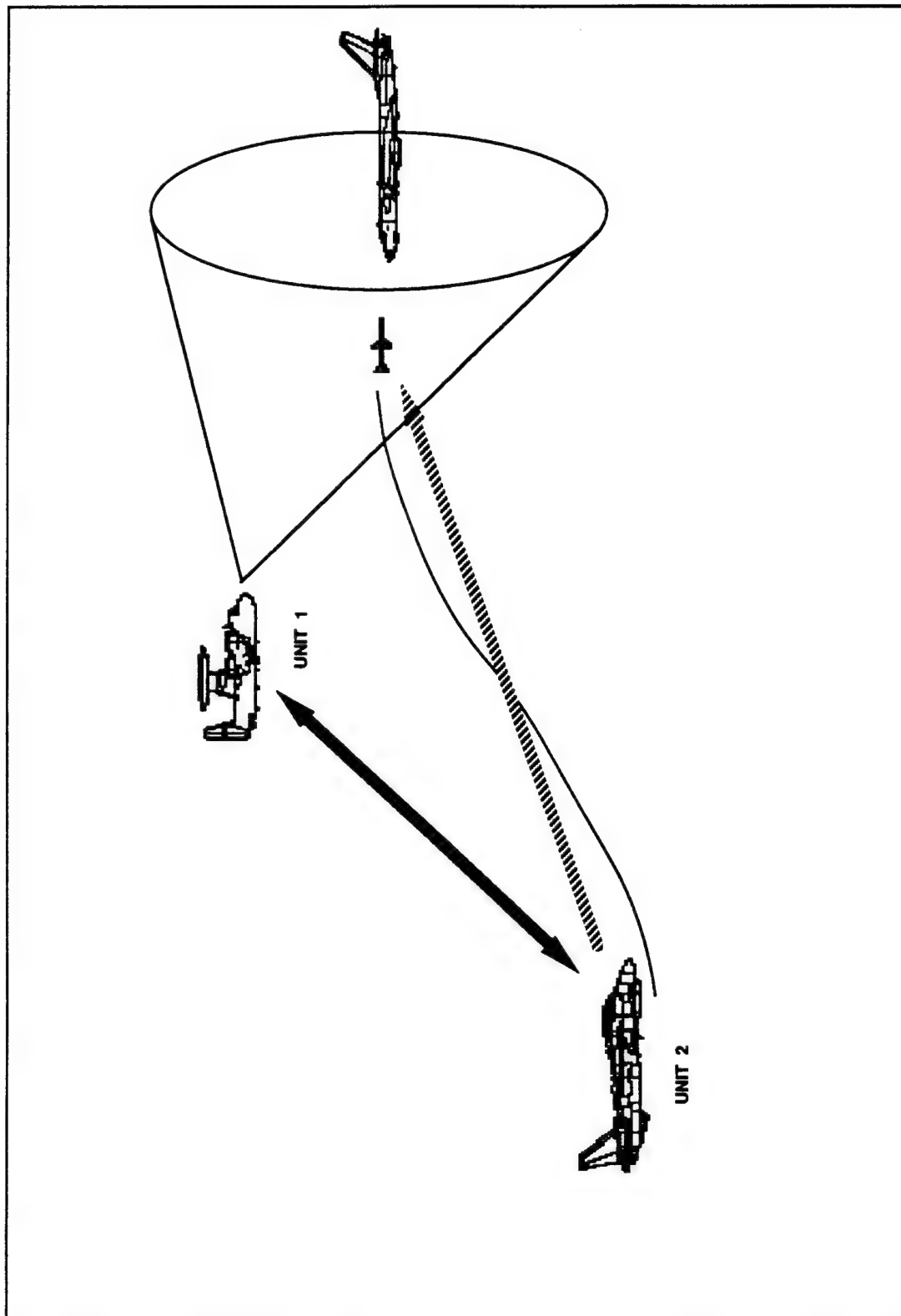


Figure G-6. Air to Air Shared Database

CASE 6 - AIR SHARED DATABASE AUGMENTED BY SURFACE, UNDERSEA, SPACE, OR LAND SURVEILLANCE

Definition

A common, shared, air database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the units of the Force, and augmented by multi-media sensors external to the Force that are accessed through other Service sources, Joint Commands, National sources, or allies. Weapon guidance and control functions would be provided by the launching platform.

Operational advantages

- All the capabilities of the air-to-air shared database, but with the additional wide area sensor advantages obtained from non-organic sources. A dramatic extension of the tactical horizon.
- More intelligent Force employment alternatives for long range tactical positioning of assets.
- Track and data information for fusion/correlation that facilitates longer range engagements, even in the presence of jamming or low observable targets.
- Additional surveillance options that provide added capabilities in the event of organic asset losses during hostilities.
- World-wide surveillance monitoring capability on a continuing basis, to determine status of forces and major logistical movements.

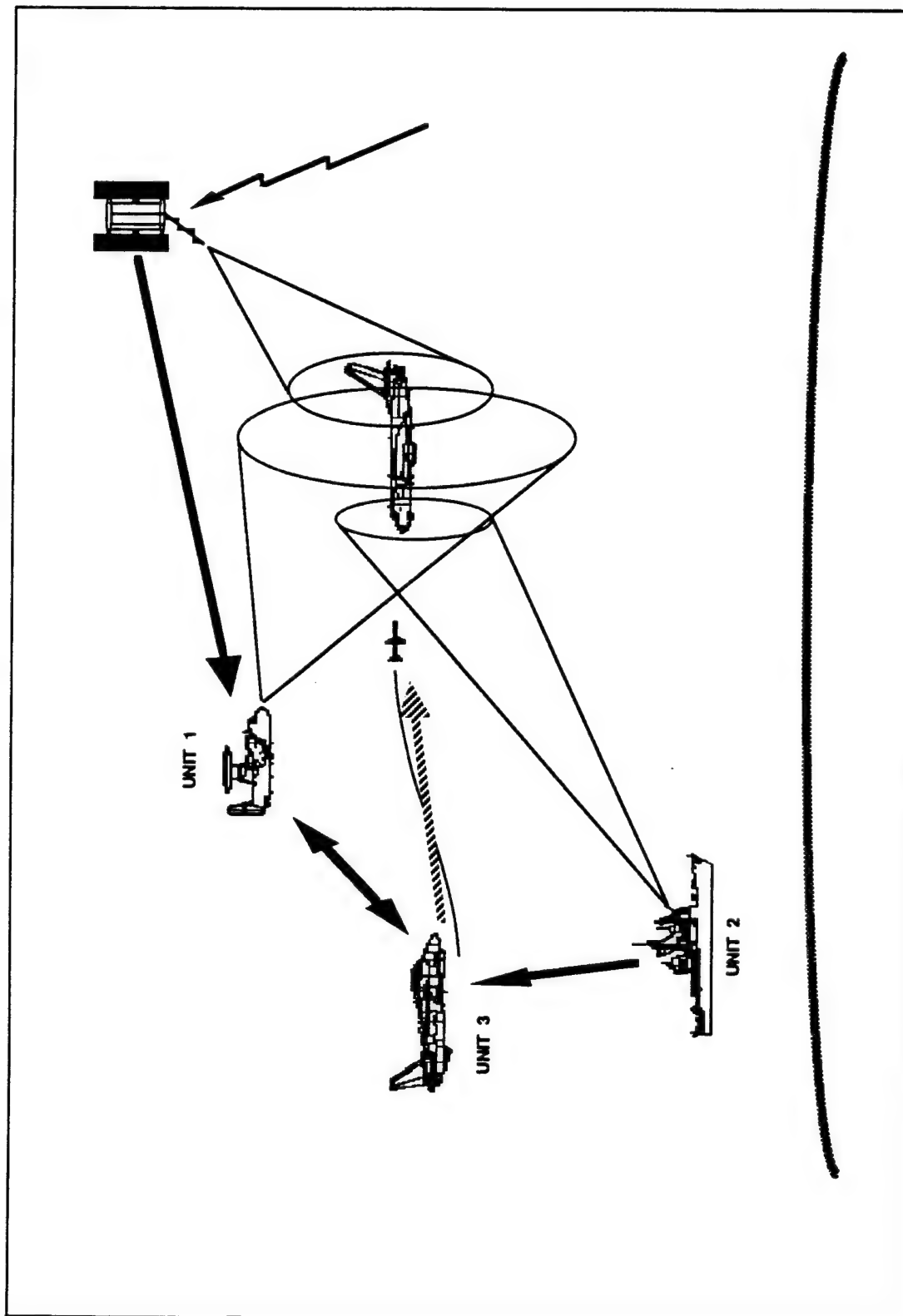


Figure G-7. Air to Air Shared Database Augmented by Surface, Undersea, Space or Land Surveillance

CASE 7 - AIR SHARED DATABASE AUGMENTED BY AIR FORWARD PASS

Definition

A common, shared, database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the air units of the Force, with the added option to launch missiles from any air unit in the Force and provide missile flight and terminal control from any properly configured air unit in the Force.

Operational advantages

- Further extends warfighting capability, thru guidance, control, and weapon employment enhancements..
- Signature management alternatives are increased. Terminal and mid-course guidance by launching platforms can be eliminated if required.
- Enhances "Silent Sam" shooter tactics through delayed, "other platform" employment of guidance and control
- Extends launch acceptable regions through expanded use of geometric relationships of controlling and launching airborne platforms. This capability can cooperatively overcome individual weapon system limitations.
- Increases options to exploit selective sensor strategies for maximum utilization of full frequency capability across the entire sensor-to-shooter spectrum.
- Further enhances capability to exploit passive ranging by spatially separated units.
- Provides near real time capability for off-axis air platforms to provide missile guidance and control functions to weapons launched from jammed platforms.

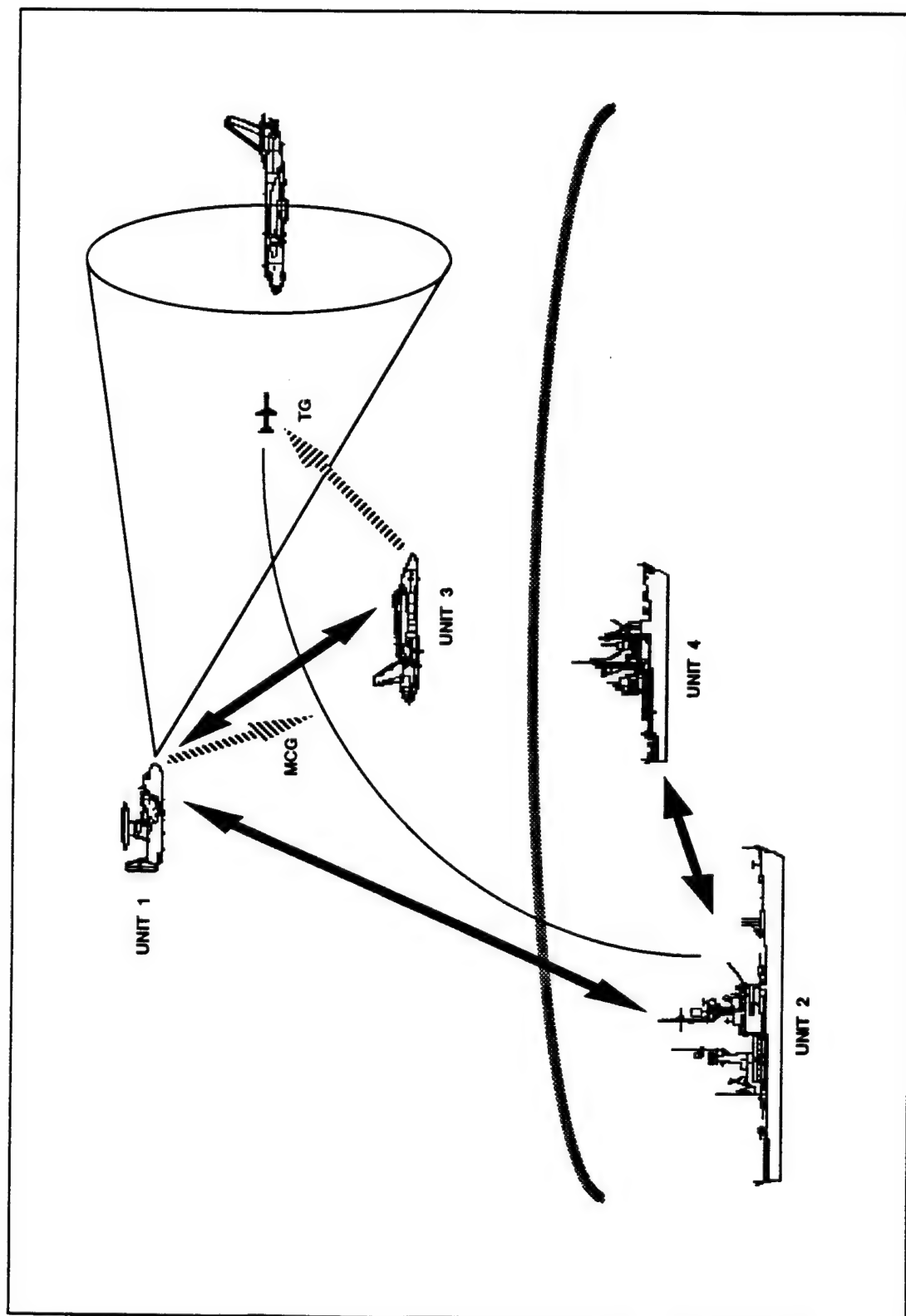


Figure G-10. Air and Surface Shared Database
Augmented by Forward Pass

CASE 8 - AIR AND SURFACE SHARED DATABASE**Definition**

A common, shared, database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the air and surface units of the Force, such that all participating air and surface units have a consistent tactical picture (appropriate to their area of operations) of engagement quality. Weapon guidance and control functions would be provided by the launching platform.

Operational advantages

- Provides all Battle Force units with the broadest scope of tactical picture, encompassing a fully shared and interchangeable sensor data collection, correlation and fusion system, representative of the entire tactical picture available in the relevant battle space.
- All-asset shared database provides fullest capability for soft kill initiatives.
- All assets are able to contribute to kill assessment.
- All assets can fully participate in exploiting signature management alternatives, counter-jamming initiatives, and other counter low-observable options.

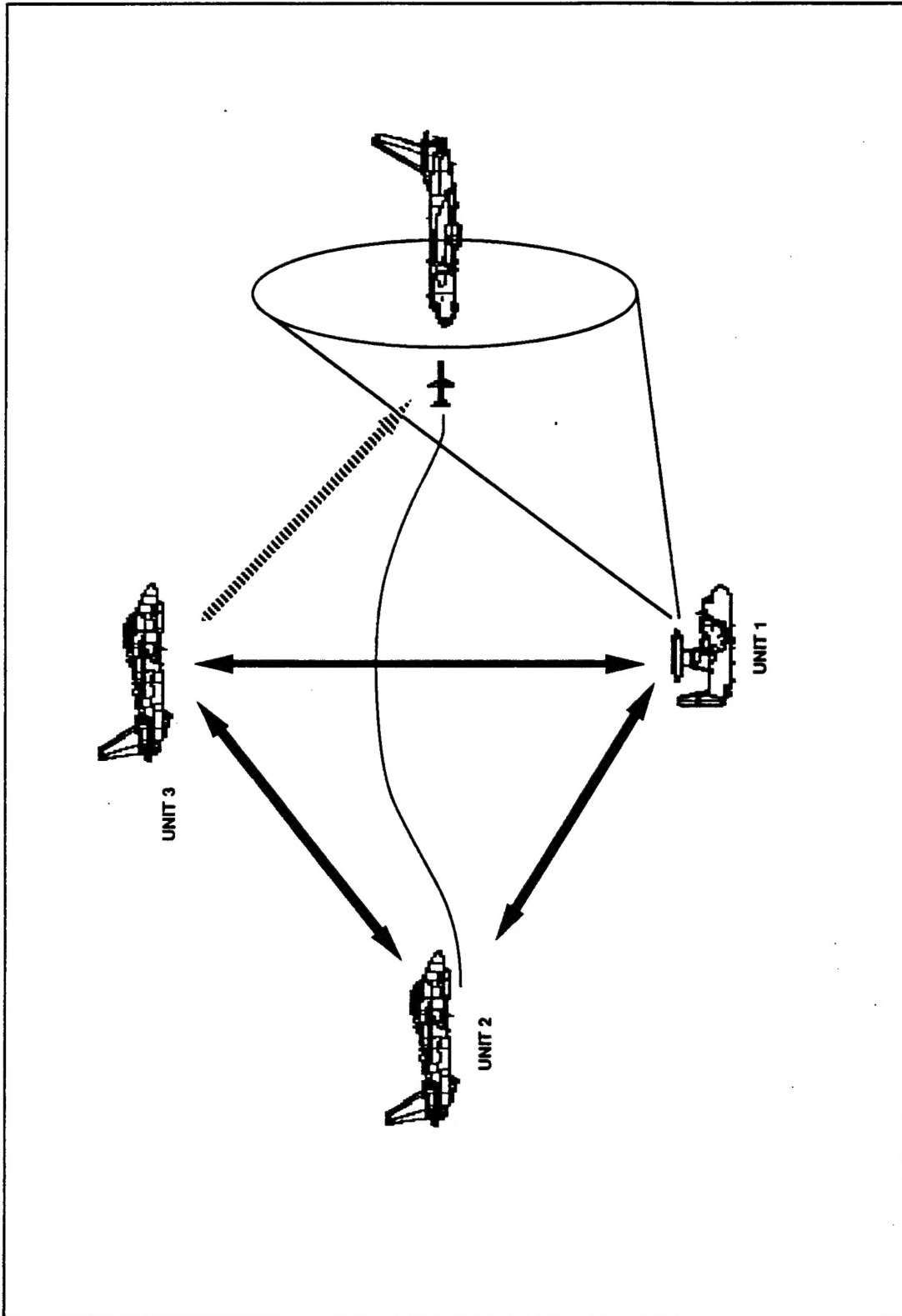


Figure G-8. Air to Air Shared Database Augmented by
Air Forward Pass

CASE 9 - AIR AND SURFACE SHARED DATABASE AUGMENTED BY FORWARD PASS

Definition

A common, shared, database of correlated/fused tracks and track fragments, obtained from all active and passive sensors resident in the air and surface units of the Force, such that all participating air and surface units have a consistent tactical picture of engagement quality, with the added option to launch missiles from any air or surface unit in the Force and provide missile flight and terminal control from any properly configured air or surface unit in the Force.

Operational advantages

- All participants have the connectivity to act in the capacity of sensor, guidance and control unit, or shooter, and with any combination of those functions limited only by the basic platform capabilities.
- Maximizes battle space horizon extension to exploit full capabilities of all units in a synergistic manner.
- Complete flexibility for any unit to operate as sensor, controller, or shooter, limited only by the basic capabilities of the individual units and weapons.
- Provides the Force Commander with maximum flexibility in weapons assignment to meet the threat.
- Shooter can operate in completely passive mode during weapon employment opportunities in all mediums.
- Full frequency spectrum and spatial positioning flexibility in guidance and control to counter threat jamming.
- Ability to leverage missile geometry to enhance Pk.
- Real time Force level TEWA options, to reallocate weapons in flight due to dynamically changing threat priorities.
- All assets are able to contribute to kill assessment. Reallocation of weapon assignment in flight is possible, to meet the dynamics of real time damage/kill assessment.
- All assets are full participants in signature management, counter-jamming options, and other counter low-observable options, including the significant advantages of in-flight change in guidance mode and controlling platform.

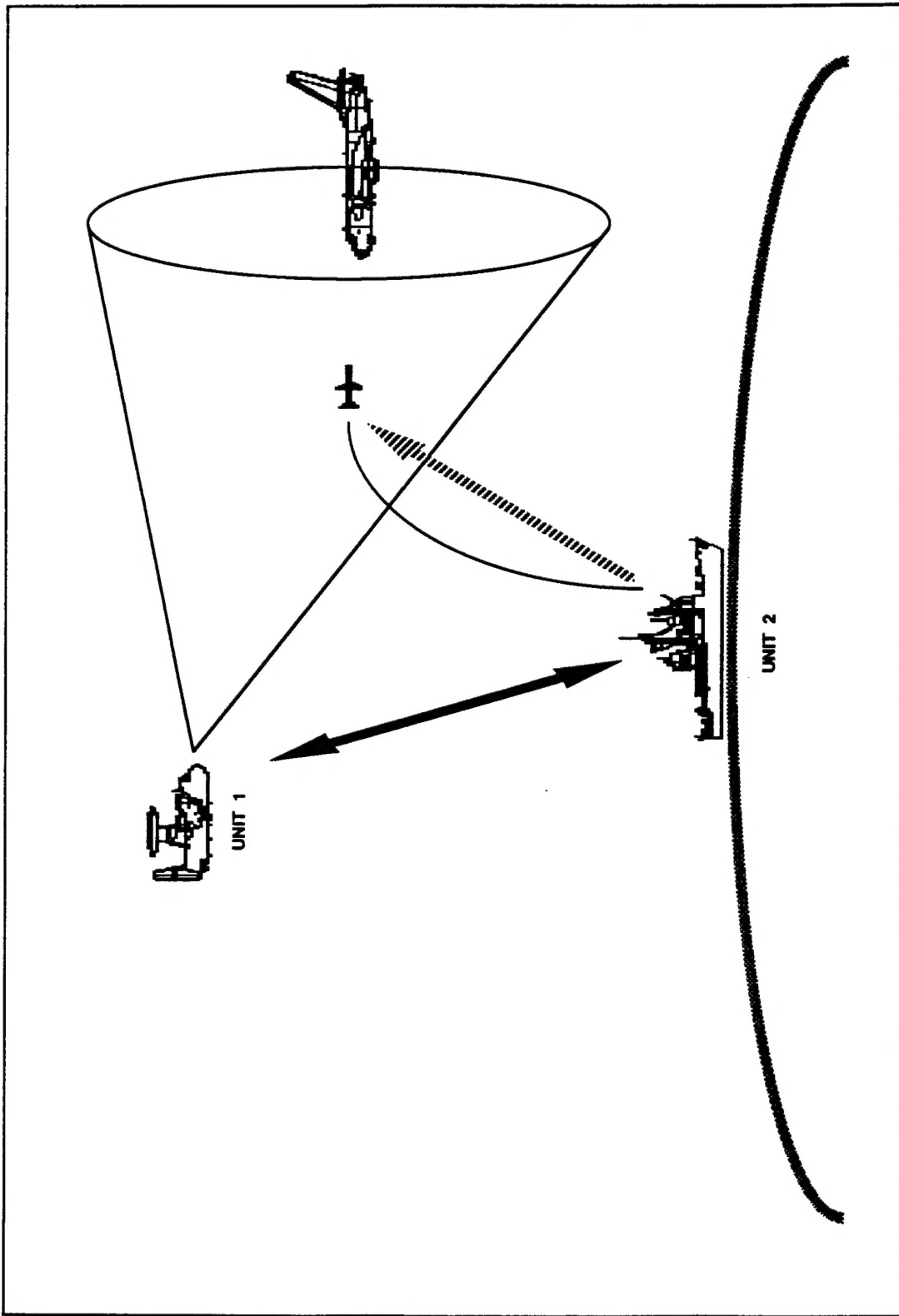


Figure G-9. Air and Surface Shared Database